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ABSTRACT

This unit of instruction was designed for the terminal science student who does not read well or who has been unsuccessful in previously attempted science courses. The course is composed of a series of suggested activities selected to give the student a brief experience in human biology. No attempt has been made to develop the topics in depth. The booklet lists the relevant state-adopted texts, suggests other references, and states the performance objectives for the unit. It provides an outline of the course content, makes suggestions for the implementation of the course, and provides a sample work sheet. Fifty-five student activities are described and related to specific performance objectives, references, and appropriate films available from the Dade County Audiovisual Center. (JR)

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AUTHORIZED COURSE OF INSTRUCTION FOR THE QUINMESTER PROGRAM

WHAT MAKES MAN GO?

5334.01

SCIENCE
(Experimental)

SE 016 514

DADE COUNTY PUBLIC SCHOOLS

DIVISION OF INSTRUCTION • 1971

ED 079137

WHAT MAKES MAN GO?

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SCIENCE
(Experimental)

Written by Nancy McCarthy
for the
DIVISION OF INSTRUCTION
Dade County Public Schools
Miami, Florida
1972

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WHAT MAKES MAN GO?

COURSE DESCRIPTION

This course is composed of a series of suggested activities selected to give the student a brief experience in human biology. Emphasis is on activities thought to be of interest to, and successfully used by the terminal science student. No attempt has been made to develop each topic in depth.

ENROLLMENT GUIDELINES

This course is designed for the student who does not read well or who has been unsuccessful in previously attempted science courses. The degree of difficulty is very low; required reading should be held to a minimum. This is a course for the terminal science student.

PERFORMANCE OBJECTIVES

The student will:

1. Investigate the function of blood.
2. Describe the function of the human heart and the pathway of blood through the heart.
3. Investigate the role of enzymes in digestion.
4. Describe what happens to food as it passes through the digestive tract.
5. Explain how the lungs function in respiration.
6. Describe the structure and function of the human kidney.
7. Investigate the role of glands in regulation.
8. Recognize the role of the nervous system in coordinating the body's activities.
9. Recognize the role of the skeleton and muscles in giving the body shape and mobility.
10. Investigate the process of human reproduction.
11. Investigate the development of the human embryo.
12. Investigate the transmission of traits from one generation to the next.
13. Examine the effects of man's activities on the environment.

COURSE OUTLINE

I. Man: The Functioning Organism

A. Circulatory system: How Are Materials Transported?

B. Digestive system: How Are Fuels Obtained?

C. Respiratory system: How Do We Get Energy?

D. Excretory system: How Are Body Fluids Cleaned?

E. Endocrine system: How Do Chemicals Regulate Our Bodies?

F. Nervous system: How Are Activities Coordinated?

G. Skeletal and muscular systems: How Do We Move?

II. Man: The Next Generation

A. Reproduction

B. Development

D. Heredity

III. Man: Part Of The Environment

A. Balance of nature

B. Overpopulation

C. Pollution

D. The future

SUGGESTIONS FOR COURSE IMPLEMENTATION

1. Particularly in a course of this type, the ingenuity of the teacher is of the utmost importance. The activities selected are ones thought by the author to work well with slow students. It should be understood that the text reference and laboratory references, in most cases, should be considered resources to be adapted for student use. In some cases, more activities have been included than can be used. The teacher should select those most suited for a particular situation.

2. General types of activities, such as dissections, microslide viewers, films, film loops, slides, etc. should be related to vary the activities.

3. When microslide sets are used, a work sheet may be provided on which the students draw what they observe and answer simple questions about the material in the folder that comes with each set. Following this page is a sample work sheet.

4. Some labs might be presented by giving the students a problem and many helpful materials and letting them work it out.

5. Students like competition —small prizes may be used for motivation (candy bar, donut, free period, etc.)

SAMPLE WORK SHEET

BIOLOGY INVESTIGATION NAME_____

The Human Respiratory System DATE_____PERIOD_____

Materials: Microslide Viewer
Microslide Booklet #72

Directions:
A. Read the directions for using the microslide strip and viewer on the inside cover of the booklet.
B. Examine each slide and sketch what you see. Label each sketch.
C. Answer all questions.

Slide One

_____

1. The single tube seen in the first slide is the_____.

2. This tube divides into the _____ which are later divided into still smaller tubes, the_____.

Slide Two

_____

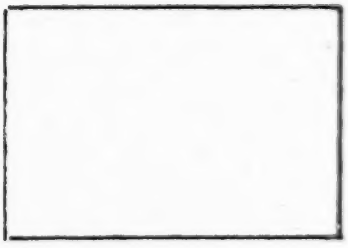
3. Why is the trachea held wide open?

_____

_____

_____

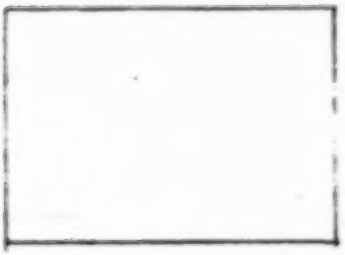
Slide Three



_____

4. The cartilage cells secrete a _____ which strengthens the cartilage ring.

Slide Four



5. The inside of the trachea is lined by _____cells.

6. These cells are covered with_____ which filters the air.

7. Mucus is secreted by the_____ cells and it filters particles missed by the cilia.

Slide Five

8. The smallest divisions of the bronchial tree are the_____which end in tiny clusters called_____.

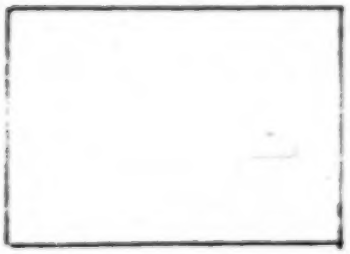
9. The exchange of _____for _____occurs in the alveoli.

Slide Six

10. The capillaries shown are located within the_____where_____is exchanged for _____.

11. The oxygen is carried by the_____.

Slide Seven



12. Particles which enter the alveoli are surrounded by cells called_____.

13. The particles are then deposited in the _____of the lungs.

14. Foreign matter such as rock dust can cause an increase in the fibrous tissue resulting in_____.

Slide Eight

15. The region of energy release in the cell is the _____.

16. Chemicals which react to reduce the carbon chain of a glucose molecule are called _____.

17. What are the major waste products of respiration?

    1.

    2.

STATE ADOPTED TEXTS AND OTHER REFERENCES

*1. Biological Sciences Curriculum Study. Biological Science: Patterns and Processes. New York: Holt, Rinehart and Winston, Inc., 1966.

*2. Brandwein, Paul et al. Life: Its Forms and Changes. New York: Harcourt, Brace & World, Inc., 1968.

3. Otto, James H., and Towle, Albert. Modern Biology. New York: Holt, Rinehart, and Winston, Inc., 1965.

4. Otto, James H., Towle, Albert and Crider, Elizabeth H. Biology Investigations. New York: Holt, Rinehart and Winston, Inc., 1968.

*5. Oxenhorn, Joseph M. and Idelson, Michael N. Pathways in Science: The Materials of Life. New York: Globe Book Company, 1968.

*6. Oxenhorn, Joseph M. Pathways in Science: Built for Living. New York: Globe Book Company, 1969.

*7. Oxenhorn, Joseph M. Pathways in Science: The Next Generation. New York: Globe Book Company, 1970.

*8. Wong, Harry K., and Dolmatz, Malvin S. Ideas and Investigations in Science - Biology. Englewood Cliffs: Prentice-Hall, Inc., 1971.

* State adopted.

ACTIVITIES

Performance Objective 1

*Reading references; #2-CH.5; #3-CH.42; #6-UN.3, CH.2,3: #8-pp. 165-170.

1. Observation of Human Blood - Students observe and study prepared slides of human blood (Wright's stain). Discussion should emphasize the different roles of the various blood cell types.

2. Capillary Circulation - Students observe capillary circulation in goldfish tails and study the effects of various stimulants and depressants on the flow of blood. (Ref. #2-p. 119; #8-p. 169)

3. The Circulatory System - Students use microslide viewers, study set #68, and complete a work sheet.

4. Hemo the Magnificent - Students view film and then discuss the role of the heart and the blood in human biology. The film is in two parts (AV#1-40027, AV#1-40032) and is best done as a two day activity.

Performance Objective 2

Reading references: (see performance objective #1)

5. Heart Dissection - Teacher demonstration with beef heart. Use a fresh heart for each class. These can be purchased from local slaughter houses. Be sure to specify that the atria not be cut. First discuss external features then open the heart and show internal features and trace the pathway of the blood. Students can then dissect preserved sheep hearts. The demonstration can be done on one day and the student lab the next. (Ref. #4-p. 313)

6. Heart Structure and Function - Students study a heart model while teacher leads discussion and explains heart structure and function.

7. Heart and Circulation - Students view any of the following films and follow up with a class discussion on the film's content. These are available from Dade County Audiovisual Center.

Circulation 16' C AV#1-12977
Circulation of the Blood 9' C AV#1-03102
Circulation: Why and How 10' C AV#1-03089
Heart and Circulation 10' BW AV#1-03093
Heart: How it Works 12' BW AV#1-03097

Performance Objective 3

Reading references: #2-CH.5,7; #3-CH.3,41; #5-UN.2,CH.4; #8-pp. 188-192.

8. The Action of Enzymes - Select any one of the following laboratory

*Reading references refer to STATE ADOPTED TEXTS AND REFERENCES

activities dealing with enzyme activity in digestion. Students may require two or three class periods for this activity since many of the labs have several parts. References for an enzyme lab are: #2-p. 113, p. 163; #4-p. 301; #6-p. 35, p. 40; #8-p. 188; B. S. C. S. Blue Version p. 143; B. S. C. S. Green Version p. 411.

Performance Objective 4

Reading references: (see performance objective #3)

9. Food to Fuel - To introduce or summarize work on digestion, the teacher should read Life reprint #34, "Food to Fuel", aloud to the class. Numerous breaks for discussion are best. Each student should have a copy of the reprint in order to follow along as the teacher reads and to see the illustrations.

10. The Digestive System - Students use microslide viewers, study set #67, and complete a work sheet.

11. The Digestion of Fat - Students do lab investigation S-15, p. 722 B. S. C. S. Blue Version.

12. Digestion - Students view the following two films and then discuss the process of digestion and the organs of digestion.
    Digestion: Chemical 18' BW Dade County AV#1-11235
    Digestion of Foods 10' BW Dade County AV#1-03115

Performance Objective 5

Reading references: #1-pp. 67-80; #2-CH.5; #3-CH.43; #6-UN.3, CH.4,5; #8-pp. 177-186.

13. Breathing Rates - In this exercise the student will recognize how breathing rate is affected by activity. Using a watch or clock with a second hand, the student will count and record how many times he breathes in and out in one minute. He will do the same thing after at least two minutes of vigorous exercise. After the lab, discuss why breathing rates increase with activity and how the lungs function in bringing needed oxygen to the blood.

14. Demonstration of Breathing Action - Teacher should first demonstrate with bell jar apparatus and then students can observe the same action in themselves. Se pp. 80-81 in reference #6.

15. The Respiratory System - Students use microslide viewers, study set #72, and complete a work sheet.

16. Smoking and Health - Students use microslide viewers, study set #73, and complete a work sheet.

Performance Objective 6

Reading references: #2-CH.5; #3-CH.42; #6-UN.3,CH.6,7.

17. Kidneys, Ureters and Bladder - Students view film and then discuss

the structure and function of the kidney (Dade County AV#1-03052 11' BW)

18. Excretion - Students use microslide viewers, study set #52, and complete a work sheet.

Performance Objective 7

Reading references: #2-pp. 193-196; #3-CH.46; #8-pp. 197-201.

19. Chemical Balance - To introduce the idea of the "chemical man", the teacher should read Life reprint #57, "Chemical Balance" to the class aloud. Numerous breaks are best. Each student should have a copy of the reprint in order to follow along with the teacher and to see the illustrations.

20. Endocrine Glands - Students view film and then discuss the general role of glands and the specific functions of the pituitary, thyroid and pancreas in maintaining a body balance. (Dade County AV#1-03411 11' BW)

21. The Endocrine System - Students use microslide viewers, study set #71, and complete a work sheet.

22. Glands and Their Secretions - Using any or all of the reading references, students should compile a chart showing the location and name of the gland, type of secretions and what an over or under secretion will do to the body. The glands to be stressed: pituitary, thyroid, adrenals, and pancreas. This activity works best when divided among several groups in the class; each with a gland to investigate. Competition between the groups for some small reward is a good form of motivation. After all information has been gathered, a single chart or poster may be made.

Performance Objective 8

Reading references: #2-CH.5; #3-CH.44; #6-UN.5, CH.1,2,3.

23. Circuits of the Senses - To introduce the work on the nervous system, the teacher should read Life reprint #35, "Circuits of the Senses", to the class. Numerous breaks for discussion are best. Each student should have a copy of the reprint so that he may follow along with the teacher and see the illustrations.

24. The Central Nervous System - Students use microslide viewers, study set #69, and complete a work sheet.

25. The Reflex Arc - Students use microslide viewers, study set #70, and complete a work sheet.

26. Reflex Actions - Students perform tasks and experiment as shown in reference #4 pp. 317-318.

27. Sensory Receptors - Students perform tasks and experiment as shown in any of the following references: #4-pp. 319-320; #6-pp. 145 & 148; and B. S. C. S. Blue Version p. 592.

*28. The Eye and Vision - Students study the anatomy and physiology of a mammalian eye, as outlined in references #4-pp. 323-328 or B. S. C. S. Blue Version pp. 584-586.

29. Hearing and Equilibrium - Students perform tasks and experiment as shown in reference #4-pp. 321-322.

30. Nervous System - Students view film and then discuss the many ways in which the nervous system controls their lives. (Dade County AV#1-03152 11' BW)

Performance Objective 9

Reading references: #2-CH.5; #3-CH.40.

31. Sciatic and Gastrocnemius Responses on Kymograph - The title of this film loop should not exclude its use. This film loop beautifully demonstrates nerve stimulus and muscle contraction. It could easily be used to motivate students into inquiry about muscle activity.

32. Muscles and Bones of the Body - Students view film and then discuss the related roles of muscles and bones. (Dade County AV#1-03138 11' C)

33. Marvel of Motion - Teacher should read Life reprint #58, "Marvel of Motion", to the class aloud. Numerous breaks for discussion are best. Each student should have a copy of the reprint in order to follow along and to see the illustrations.

34. Investigating Contraction of Smooth and Cardiac Muscle - Students do lab investigation involving dissection of a frog to get smooth and cardiac muscle. The reaction of these difference muscle types is recorded when treated with different chemicals. Reference - B.S.C.S. Blue Version pp. 617-618.

35. Demonstration of Fatigue in a Skeletal Muscle - Teacher may demonstrate this lab or let small groups of students try their hand at it. Reference - B.S.C.S. Blue Version pp. 620-623.

36. The Skeleton - Students view film and then discuss the role of the skeleton in maintaining body shape and in motion. A comparison of different skeletons - lobster, bird, man, and elephant - might also be discussed. (Dade County AV#1-03056 12' BW)

Performance Objective 10

Reading references: #1-pp. 135-192; #3-CH.47; #7-UN.3; #8-pp. 112-114.

* See procedure for obtaining specimens from slaughter houses.

37. The Moment Life Begins - Teacher should read Life reprint #53, "The Moment Life Begins", aloud to the class. Numerous breaks for discussion are best and each student should have a copy of the reprint in order to follow along with the teacher.

38. Human Reproductive Cycle - Students should do the program in reference #1 pp. 167-186. As this is a lengthy activity, two or three class periods may be required.

39. Human Reproduction and the Menstrual Cycle - This film loop is good for either introducing the above-mentioned program, or for a wrap-up activity.

40. Human Reproduction - Students use microslide viewers, study set #62, and complete a work sheet.

Performance Objective 11

Reading references: #3-CH. 47

41. Life Before Birth - Teacher should read Life reprint #27, "Life Before Birth", to the class. Numerous breaks for discussion are best. This particular reprint is excellent and the photographs are a superb motivational device for leading into a study of development. Each student should have a copy of the reprint in order to follow along and to see the illustrations.

42. Embryology of the Chick - This lab is an excellent demonstration of development in a non-mammalian organism. It has many options - a two period lab in which 3 and 5 day embryos are studied; a daily check on development; demonstrations at various stages; etc. References may be found in many sources, among them: B. S. C. S. Blue Version pp. 349-350 or B. S. C. S. Yellow Version Lab Manual pp. 173-177.

43. Development of the Chick - Students view film and then discuss the gradual changes which bring about a new baby chick. This film is an excellent lead-in to the chick lab mentioned above. (Dade County AV#1-03856 10' BW)

44. Chick Embryology - Teacher should read Life reprint #77, "Chick Embryology", aloud to the class. This could function as a wrap-up after the lab.

45. Dissection of the Fetal Pig - This may be done as a demonstration or as a student lab. It demonstrates development in a mammal. Reference #4 pp. 289-292.

Performance Objective 12

Reading references: #1-pp. 195-232; #2-CH. 17, 18; #3-CH.9, 12; #7-UN.4; #8-pp. 125-158.

46. Genetic Facts and Fallacies - Students conduct a class survey of ideas involving genetics. Reference #4 pp. 69-70. This is a good device for opening work on genetics.

47. Study of Mendellian Laws - Students perform exercise as indicated in reference #4 pp. 71-75.

48. Human Genetic Traits - Students poll class on the number of individuals with the following traits: tongue rollers, non-rollers, tasters (PTC), and non-tasters, free ear lobes and attached ear lobes.

49. Chromosomes and Genes - Students perform exercise as indicated in reference #4 pp. 77-79.

50. Genetics of Blood Typing - Students type their own blood and study the distribution of the blood groups in the class. How does class distribution compare to known distributions for the entire population? Reference B.S.C.S. Blue Version pp. 399-401. PERMISSION SLIPS MUST BE OBTAINED AND SIGNED BY PARENTS OR GUARDIANS OF YOUR STUDENTS BEFORE DOING THIS ACTIVITY.

Performance Objective 13

Reading references: #1-pp. 53-62; #2-CH.20; #3-Ch.48-53; #8-pp.213-273.

51. Balance in Nature - Use this film to introduce the idea of biological controls. This should be followed by a discussion of the results of man's tampering with the balance of nature. (Dade County AV#1-11141 17' C)

52. Contemporary Problems - The teacher and the class should select any or all of the following Life reprints to study:

93 Fight Over Wilderness
98 Balance of Nature
92 Cars & Cities
95 Overpopulation
99 Food For The Future
91 Environment: What Can Be Done?
20 Cities for Tomorrow
69 Air Pollution
76 Water Pollution

53. Current Events - Students can compile a notebook of newspaper clippings dealing with environmental problems. This might be a good "extra-credit" project. It should cover a span of at least 7-10 days. Class discussion of selected articles is desirable.

54. Community Problems - Students should try to identify and compile a list of environmental problems which they see in their own

neighborhoods or communities. Class discussion should lead to some possible solutions.

55. A List of Do's and Don'ts - Through class discussion and the preceding activities, the class should draw up a list of things which the individual can do to improve and preserve his environment.

REQUESTS FOR BIOLOGICAL SPECIMENS FROM SLAUGHTER HOUSES

There is a procedure which must be followed when requesting specimens from slaughter houses:

1. Contact a slaughter house and make tentative arrangements for the desired specimens.

2. Write a letter, making at least one carbon copy, on your school stationery to:

   Dr. E. C. Kaplan
   Bureau of State Meat Inspection
   Post Office Box 567
   Hialeah, Florida 33010

   In the letter state clearly:

   a. Arrangements which have been made with the slaughter house, give the name of the slaughter house.

   b. Specimens will be used strictly for educational purposes.

   c. Specimens will be destroyed by you or under your immediate supervision and they will not enter any food or food products.

3. Take a carbon copy of the letter to the slaughter house and get the specimens.

4. You do not have to wait for approval, but you must send the letter and you must take the carbon copy to the slaughter house.